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VISUOSPATIAL/VOCABULARY DIFFERENCES IN BOYS AND GIRLS AND A POTENTIAL AGE-DEPENDENT DRIFT IN VOCABULARY PROFICIENCY [1]

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Summary.—A total of 188 monolingual (English) boys and girls whose ages ranged from 6 years through 14 years were administered the Vocabulary and Block Design subtests of the Wechsler Intelligence Scale for Children. Although the boys ($n = 85$) displayed significantly greater relative strengths for the visuospatial task than the girls ($n = 103$), the effect was due primarily to the boys' less proficient Vocabulary scores. The detection of a significant linear decrease ($r = -.32$) in standardized scores for Vocabulary but not for Block Design over this age span was not expected. The drift over 9 grades was equivalent to more than one standard deviation. Possible sources of interference such as exposure to the same second language that occupied 6% to 12% of the instructional time are suggested.

Actual sex differences on tasks which are not confounded by either stereotypy or conspicuous role-specific variables, e.g., diary writing, playing with dolls, exhibit an effect size that is usually equivalent to *eta* values between 0.20 and 0.30, i.e., 4% to 10% of the variance. Waber (1976) argued that the sex differences were artifacts of differential maturation. We decided to re-examine this question by comparing the standardized scores for Block Design and Vocabulary subtests of the Wechsler Intelligence Test for Children (revised) as well as the net differences between these subtests (Block Design and Vocabulary) and the proportional differences between these subtests (the difference between scores for Block Design and Vocabulary divided by the score for Block Design) for children whose ages ranged from 6 years through 14 years. If Waber's hypothesis is correct, a statistically significant interaction between age and gender should occur for these tests.

METHOD

To test this hypothesis, a total of 188 children were selected as subjects from four different primary and secondary schools. There were 85 boys and 103 girls. All subjects were monolingual (English), had received parental consent for participation, and were considered average scholastically by their teachers. They were exposed to the country's other official language, French, approximately 20 min. to 40 min. per day, 5 days per week. In a single set-

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ting each child was administered the two subtests of the WISC–R. The means and standard deviations for the standardized scores for each age and sex for the Vocabulary and Block Design tests are shown in Table 1.

TABLE 1
MEANS AND STANDARD DEVIATIONS FOR STANDARDIZED SCORES ($M = 10$, $SD = 3$) ON WISC–R VOCABULARY AND BLOCK DESIGN SUBTESTS BY NINE DIFFERENT AGE GROUPS

Age, yr.	*n*	Vocabulary		Block Design	
		M	*SD*	*M*	*SD*
6	23	12.1	3.5	10.6	2.6
7	30	11.8	3.0	11.5	2.9
8	25	11.7	3.1	12.3	2.7
9	18	11.8	3.7	12.0	2.7
10	18	10.8	2.7	10.9	3.0
11	20	10.9	2.1	11.0	3.1
12	19	9.6	2.1	11.9	2.3
13	17	10.1	1.2	11.5	2.3
14	18	9.3	2.2	11.2	2.1

RESULTS

Multivariate analysis of variance gave a significant interaction between scores for these tests (Vocabulary vs Block Design) and the age of the students ($F_{8,170} = 2.90$, $p < .01$). *Post hoc* analyses (POLYNOMIAL) indicated that the source of the interaction was due to the progressive and linear decrease (linear term $= F_{8,179} = 19.98$, $p < .001$) in the standardized Vocabulary scores with age compared to the absence of this age effect for the Block Design scores ($F_{8,179} = 0.04$, $p > .05$). Regression analyses ($r = -0.32$, $p < .001$) indicated that the effect was comparable to a decrease of 0.33 of a standardized unit (3 units = 1 *SD*) for every year of school and would result in a general decrement of more than one standard deviation between Grades 1 and 12.

There were no statistically significant main effects among ages ($F_{8,170} = 1.44$, $p > .05$) or gender ($F_{1,170} = 0.03$, $p > .05$); the interaction between age and sex ($F_{8,170} = 1.20$, $p > .05$) was also not significant. The interaction between sex and the type of test ($F_{1,170} = 3.43$, $p = .07$) also was not statistically significant. The means and standard deviations for the scores for Block Design and Vocabulary for the boys (paired t test $= 2.61$, $p < .05$) were 11.8 (3.1) and 10.8 (3.2), respectively, while these scores for the girls (paired t test $= 0.01$, $p > .05$) were 11.3 (2.4) and 11.3 (2.6), respectively.

However, a two-way analysis of variance (sex, age) indicated that the boys displayed significantly higher scores for the net differences between Block Design and Vocabulary ($F_{1,170} = 4.29$, $p < .05$; *eta* $= 0.15$) and for the proportional differences in these two subtests ($F_{1,170} = 6.13$, $p < .01$; *eta* $= 0.18$).

The means and standard deviations for the proportions (net difference divided by the Vocabulary score, multiplied by 100 for each subject) for the boys were 16% (39%) and 4% (28%) for the girls.

Whereas the age effect was significant statistically ($F_{8,170}=3.05$, $p<.01$; $eta=0.34$) for the net differences in scores, it was not significant for the proportions ($F=1.90$, $p>.05$). *Post hoc* tests (Tukey, $p<.05$) indicated that the major source of the age effect for the net differences in scores was due to the sudden relative improvement in Block Design scores that occurred between ages 11 and 12 years and was maintained. Neither analysis showed a significant interaction for sex by age ($F_{1,170}<1.00$, $p>.05$).

These results do not support Waber's (1976) hypothesis. If differential maturation had occurred, a statistically significant interaction between the proportions for the primary verbal and primary performance tasks and age would have been evident. The gender effect was independent of age and exhibited a predictable effect size that would be comparable to a correlation coefficient of about .18. However, close scrutiny of the gender effect indicates that the boys' apparent enhanced proficiency for the Block Design scores is not reflected by the absolute scores. The apparent strength exhibited by the boys was due to their relative weakness for Vocabulary; the girls did not display this discrepancy and exhibited comparable scores for both subtests. The lower general proficiency of the normal male brain for language relative to the normal female brain has been frequently reported (Kolb & Whishaw, 1990; Makarec & Persinger, 1993).

The progressive and linear decrement in vocabulary proficiency, relative to normative data, suggests that there is some chronic and insidious process which accumulated over time within this sample. That the anomaly is artifactual to this sample is not likely since the standardized Block Design scores did not exhibit this decline. Two candidates might accommodate this discrepancy, (1) competition from a second language (French) which was given 100 min. to 200 min. per week (between 6% and 12% of the total instructional time) instead of English or (2) an alteration in teaching protocols such as fewer spelling tests or emphasis upon "whole sight" interpretation of texts. Considering the age of the oldest students, this process would have been initiated and maintained for at least the previous 10 years.

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